UNITED STATES PATENT AND TRADEMARK OFFICE

Appl./ Serial No.:	09/769,851	Confirmation No. 5503
Application of:	Timo SAARNIMO	
Filed:	January 25, 2001	
TC/AU.:	2618	
Examiner:	Yuwen Pan	
Docket No.:	KOL043-820865	
For:	**WEARABLE DEVICE**	

APPEAL BRIEF (37 C.F.R. §41.37)

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February 28, 2007

Sir:

This Brief is in furtherance of the Notice of Appeal, filed in this case on October 30, 2006.

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I. REAL PARTY IN INTEREST (37 C.F.R. §41.37(c)(1)(i))

The real party in interest is SUUNTO OY, the assignee of record.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. §41.37(c)(1)(ii))

NONE

III. STATUS OF CLAIMS (37 C.F.R. §41.37(c)(1)(iii))

Claims 1-19 are on appeal and all stand REJECTED.

IV. STATUS OF AMENDMENTS FILED SUBSEQUENT TO FINAL REJECTION (37 C.F.R. §41.37(c)(1)(iv))

No amendment has been filed subsequent to the Final Rejection mailed May 30, 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. §41.37(c)(1)(v))

Claim 1 is the only independent claim on appeal. The claim is repeated below with reference to passages in the application as published providing support, in bold type.

Independent claim 1 relates to a wearable device comprising:

one or more circuit substrates comprising electrically conductive parts being disposed in at least a first plane; **{Col. 2, lines 6-7 and 67-69; col. 3, lines 1-4; Fig. 1 ref. char. 11 and 14}**

a radio unit operating at a radio frequency; **{Col. 2, lines 7-8; col. 3, line 5; Fig. 5}**

and a loop antenna coupled to the radio unit, **{Col. 2, line 7; col. 3, lines 6-7; Fig. 1 ref. chars. 10, 12, and 13}**

the loop antenna consisting of a single loop formed of a conductor, **{Col. 2, line 8; col. 3, lines 7-8; Fig. 1 and 4 ref. char. 10}**

the loop defining an area and being disposed in a second plane; **{Col. 2, lines 12-14; Figs. 1-4}**

wherein the electrically conductive parts of at least one of said one or more circuit substrates substantially act as a ground plane causing a ground plane effect for the loop antenna **{Col. 2, lines 10-12; col. 3, lines 15-45}**

and wherein said first plane is substantially coplanar with said second plane **{Col. 2, lines 12-14; col. 3, lines 18-45; Figs. 1-4}**

and such that at least the electrically conductive parts of said at least one circuit substrate are within said area defined by the loop when observed in plan view minimizing the ground plane effect of the electrically conductive parts of said at least one circuit substrate on the loop antenna. **{Col. 2, lines 14-20; col. 3, lines 15-45; Figs. 1 and 4}**

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. §41.37(c)(1)(vi))

Whether claims 1-19 are patentable under 35 U.S.C. 103(a) over U.S. Pat. No. 6,278,873 to Itakura et al. in view of U.S. Pat. No. 5,926,144 to Bolanos et al. and U.S. Pat. No. 6,825751 to Kita et al..

VII. ARGUMENT (37 C.F.R. §41.37(c)(1)(vii))

A. Rejection

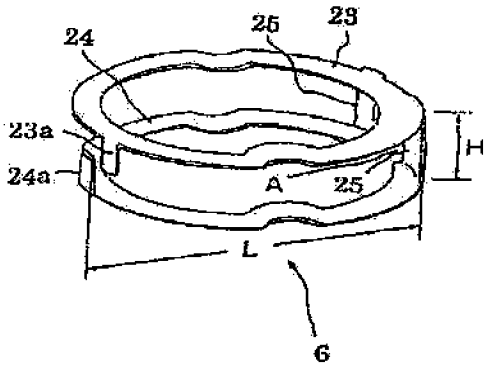
Independent claim 1, as well as dependent claims 2-29, stand rejected by the Examiner as unpatentable under 35 U.S.C. § 103(a) over U.S. Pat. No. 6,278,873 to Itakura et al. (hereinafter "Itakura") in view of U.S. Pat. No. 5,926,144 to Bolanos et al. (hereinafter "Bolanos") and U.S. Pat. No. 6,825751 to Kita et al. (hereinafter "Kita").

B. Primary Reference

Examiner concedes that the Itakura reference does not disclose all the limitations of the claimed invention (Final Office Action of May 30, 2006, page 3, last paragraph). Specifically, the Itakura reference does not teach that (1) the loop antenna is a single loop; and (2) that the plane of the loop is substantially coplanar with the plane of the circuit substrates, as claimed. A third claimed element that is absent from the teachings of Itakura, yet not addressed by the Examiner, is (3) a loop antenna being disposed in a second plane.

Rather, Itakura discloses a wristwatch-type communication device with a *double-loop* antenna. The loop shaped antenna 6 of Itakura comprises a first conductor portion 23 formed in a ring and constituting the first loop. A second conductor portion 24 opposed to the first conductor portion 23 which constitutes a second loop. Obviously, Itakura does not disclose a single loop antenna.

A third conductor portion 25 connects the first and second conductor portions 23 and 24. The loop antenna 6 starts from feeder terminal 23a and continues through parts 23, 24, and 25, respectively. The antenna ends at feeder terminal 24a. As can be clearly seen from the figure below reproduced from Fig. 1 of the Itakura patent, the loop antenna of Itakura actually resides in *three* planes rather than in a single plane.



(Adapted from Fig. 1 of Itakura)

The first plane is created by conductor loop 23. The second is the parallel plane created by conductor loop 24. Finally, the third plane is perpendicular to the first and second planes. Conductor elements 23a, 24 and 25 reside in the third plane.

Finally, it is impossible for the antenna of Itakura to be substantially coplanar with the plane of the circuit substrates since the antenna itself has multiple planes that are perpendicular.

Consequently, it is clear that the Examiner is correct that the Itakura reference does not teach that (1) the loop antenna is a single loop and (2) that the plane of the loop is substantially coplanar with the plane of the circuit substrates, as claimed. Additionally, the antenna of Itakura does not reside (3) in a second plane. Rather, it resides in multiple planes.

C. **Secondary References**

In order to make a prima facie case of obviousness, all claim limitations must be taught or suggested. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). In view of the elements not taught by Itakura, Examiner relied on Bolanos for the disclosure of a loop antenna that has a single loop (Final Office Action of May 30, 2006, page 3, last paragraph). According to the Examiner, Bolanos teaches that the loop antenna comprises a single loop.

Examiner relied on Kita to teach the second element not taught by the primary reference Itakura (Final Office Action of May 30, 2006, page 4, second paragraph). Specifically, the Examiner used Kita to teach that the plane of the antenna is substantially coplanar with the plane of the circuit substrates.

It is Applicant's contention that Examiner has failed to establish a prima facie case of obviousness for the following reasons: (1) there is no suggestion or motivation to combined the

single loop antenna of Bolanos with the teachings of Itakura; (2) Kita is non-analogous art and can therefore not be used in combination with Itakura and Bolanos; and (3) none of the references teach a single loop antenna disposed in a second plane.

1. **No suggestion or motivation to combine Itakura with Bolanos**

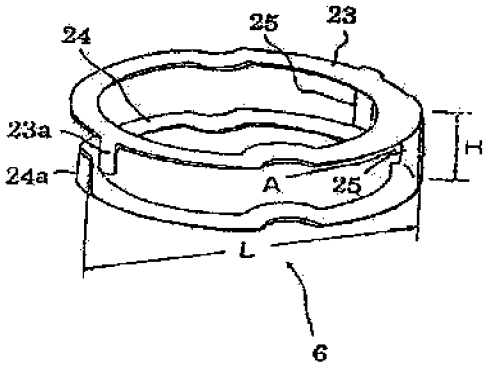
Examiner stated that it would have been obvious to one of ordinary skill at the time the invention was made to modify Itakura by replacing its double-loop antenna with the single loop antenna of Bolanos (Final Office Action of May 30, 2006, page 4, first paragraph). The Examiner suggested that the motivation for such a modification is that the wearable device could be made much thinner. While Applicant does not deny that the Itakura reference does seek to create a thinner device, in viewing the reference as a whole it is clear that Itakura teaches away from a single loop antenna.

a. Itakura teaches away from a single loop antenna

The appropriate manner for determining the validity of a combination is to analyze the prior art reference in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. MPEP 2141.02(VI) citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). Accordingly, it is important to review the teachings of the Itakura reference that do not lend themselves to such a combination.

The gain of the antenna of Itakura is determined by the aperture area S of the antenna (col. 6, first paragraph). Itakura defines the aperture area S as the projection length of the first and second conductors L multiplied by the distance between the first and second conductors H.

(S = L x H). These dimensions are most clearly illustrated in Fig. 1.



S = L x H

↑L → ↑S
and/or
↑H → ↑S

Itakura goes on to state that receiving sensitivity is increased by increasing the aperture area S (col. 2, lines 40-45; col. 6, second paragraph). From the equation S = L x H, it follows that the aperture area S can be increased ↑S by increasing either length L and/or height H (↑L and ↑H, respectively). The converse is also true, i.e. decreasing the length L or height H will lead to a decrease in aperture area S. A decrease in aperture area S, would lead to decreased receiving and transmission sensitivity which translates to a decrease in overall function of the antenna.

Since one of the main objectives of Itakura is to provide favorable transmission and reception sensitivity (col. 2, lines 40-45), it follows that it is important to have the largest aperture area S, limited by the area available within the watch casing. Modifying Itakura to have a single loop antenna would be the equivalent of reducing the distance between the first and second conductors H to zero. The aperture area S of the antenna would be non-existent or negligible at best. With the teachings of Itakura in mind, one skilled in the art would expect unfavorable reception and transmission sensitivity since it is an increase, not a decrease, in aperture area S that improves performance. Accordingly, Itakura teaches away from a combination with the antenna of Bolanos and no suggestion or motivation can be found to combine the references. As a result, a person skilled in the art would not have the alleged

motivation to combine the teachings of Itakura and Bolanos. Without the combined teachings of the Itakura and Bolanos references, the rejection of the claimed invention cannot stand.

With this teaching of Itakura currently in mind, it is opportune to note that Itakura teaches away from the solution of the claimed invention which requires the loop antenna to reside in a plane ("a second plane"). Since a plane is two-dimensional, there can be no L x H. There is no H in the claimed invention. Those skilled in the art could not have found a suggestion or motivation in Itakura to make the modifications suggested by the Examiner because the teachings of Itakura would have led them to the conclusion that the antenna would perform unsatisfactorily. This argument will be discussed further in subsection 3, below.

2. Kita is non-analogous art

The Kita reference does not deal with loop antennas. Rather, Kita deals with coil antennas which are very different from loop antennas (col. 7, line 40; col. 13, lines 47-61). A loop shaped coil antenna is not the equivalent of a loop antenna. Since the coil antenna of Kita is not analogous to the loop antennas of the claimed invention nor the antennas of Itakura, there can be no suggestion or motivation to combine the teachings of Itakura with Kita.

The Kita reference explains the operating mechanism of a coil antenna as transmitting and receiving signals by means of electromagnetic induction which is a magnetic flux coupling the antenna coil to another coil for transmission between them (col. 1, lines 36-50; col. 13, lines 33-34). Coil antennas utilizing electromagnetic induction are able to receive data only over a relatively short distances in the magnitude of tens of centimeters. Loop antennas, on the other hand, are intended to be used with remote paging devices whose data must be transmitted hundreds of meters. Accordingly, one skilled in the art would not look to coil antennas for solutions for problems relating to loop antennas in paging systems.

As an example of why one skilled in the art would not look to coil antennas for solutions, consider that the magnetic flux emitted by a coil antenna can penetrate directly through any ground plane formed by circuit substrates. However, a loop antenna operates via an electric field and thus cannot penetrate a ground plane. Accordingly, one skilled in the art would not turn to teachings relating to the positioning of a coil antenna to solve a loop antenna positioning problem because there operating mechanisms are non-analogous. The strengths and limitations of these two types of antennas are not the same rendering teachings regarding one useless in application to the other.

Furthermore, Itakura specifically teaches away from using coil antennas by stating that a device with a coil antenna "has a problem of poor receiving sensitivity and degraded communication device performance ..."; see, Column 1, lines 33-38, of Itakura. Thus, a person skilled in the art, after consulting Itakura, would know that coil antennas are inferior and would therefore not use any of the teachings of Kita, which only relate to the use of a coil antenna. In fact, the distinction between a coil antenna and a loop antenna is used by Itakura to distinguish itself from the prior art. Clearly, these antennas are not analogous. Accordingly, there is no suggestion or motivation in the cited references to alter the placement of the loop antenna of Itakura based on the teachings of Kita.

3. No teaching of loop antenna disposed in a second plane

One of the elements of claim 1 that was not disclosed in Itakura is "the loop antenna consisting of a single loop formed of a conductor, the loop defining an area and being disposed in a second plane". None of the references teach a loop antenna disposed in a plane. Consequently, the claims are nonobvious.

a. Bolanos antenna

Bolanos discloses an antenna 302 having a rectangular antenna aperture 436 formed from conductor portions 418, 420, 422, and 416. Referring to Figs. 4 and 5 of Bolanos, it can clearly be seen that the antenna is not planar, but rather extends in all three dimensions, i.e. it requires substantial height, length, and width 430. Accordingly, the antenna of Bolanos is not disposed in a plane. In fact, Bolanos explicitly teaches away from a planar antenna. In col. 4, lines 21-27, Bolanos teaches that the width 430 of the looped conductor is substantially greater than the thickness 432 in order to minimize resistance. Clearly, Bolanos did not feel that a planar antenna would function adequately. Bolanos teaches away from a planar antenna by emphasizing the width 430 of the conductors, which is perpendicular to the plane of the antenna, as critical to ensuring the effective antenna aperture is maximized.

b. Kita antenna

Regarding the Kita reference, as discussed above, the coil antenna is not analogous to a loop antenna. Therefore, Kita cannot be used to teach a loop antenna consisting of a single loop formed of a conductor, the loop defining an area and being disposed in a second plane. A coil antenna is not a loop antenna. Furthermore, coil antennas are wrapped in turns many times in order to improve their transmission/reception capabilities. They certainly cannot be used to teach a loop antenna disposed in a plane.

c. Itakura teaches away from planar antenna

In subsection 1, it was argued that Itakura teaches away from a single loop antenna. One of the reasons given was that Itakura relies upon the aperture area of the antenna for its transmission and reception. Itakura defines the aperture area S as the projection length of the

conductors L multiplied by the distance between the first conductor and the second conductor H. Clearly, two conductor loops are required in order to have a distance between them H.

In a similar manner, Itakura teaches away from having a planar loop antenna. The teaching of Itakura requires that an aperture area S be formed with horizontal L and vertical H dimensions in order to have proper reception and transmission. The aperture area S taught by Itakura is perpendicular to the plane of its antennas. If there is no conductor portion that is perpendicular to the loop, then there can be no H dimension. Without the height the aperture area S is 0 and, according to the teachings of Itakura, the antenna would have poor reception and transmission sensitivity. Accordingly, there is no suggestion or motivation to modify Itakura as suggested by the Examiner whether or not the feature is actually taught by the secondary references.

D. Conclusion

In view of the above, none of the references, either alone or in combination, disclose the claimed invention. Specifically, there is no teaching of a single loop antenna since the antenna of Bolanos cannot be combined with the teachings of Itakura. There is no disclosure regarding the first and second planes being substantially coplanar since the coil antenna of Kita is non-analogous art and can therefore not be used in combination with the loop antennas of Itakura and Bolanos. Finally, none of the references teach a single loop antenna disposed in a second plane. Accordingly, it is respectfully requested that the rejection be overturned. For at least the reason of their dependence, either directly or indirectly, from claim 1, it is respectfully submitted that claims 2-19 are also patentable.

VIII. CLAIMS APPENDIX (37 C.F.R. §41.37(c)(1)(viii))

1. A wearable device comprising:

one or more circuit substrates comprising electrically conductive parts being disposed in at least a first plane;

a radio unit operating at a radio frequency; and

a loop antenna coupled to the radio unit, the loop antenna consisting of a single loop formed of a conductor, the loop defining an area and being disposed in a second plane; wherein the electrically conductive parts of at least one of said one or more circuit substrates substantially act as a ground plane causing a ground plane effect for the loop antenna and wherein said first plane is substantially coplanar with said second plane and such that at least the electrically conductive parts of said at least one circuit substrate are within said area defined by the loop when observed in plan view minimizing the ground plane effect of the electrically conductive parts of said at least one circuit substrate on the loop antenna.

2. The wearable device of claim 1, wherein the radio unit is mounted on one of said one or more circuit substrates.

3. The wearable device of claim 1, wherein said at least one circuit substrate is positioned entirely within the area defined by the loop, when said at least one circuit substrate and the loop are observed perpendicularly with respect to the second plane.

4. The wearable device of claim 1, wherein the loop antenna is formed on the periphery of said at least one circuit substrate.

5. The wearable device of claim 1, wherein the loop antenna is coupled to the radio unit via a balancing means.

6. The wearable device of claim 5, wherein the balancing means comprises a balancing transformer.

7. The wearable device of claim 5, wherein the balancing means comprises a balanced transmission line.

8. The wearable device of claim 1, wherein said at least one circuit substrate and the second plane have a maximum vertical distance of about 0.1 times a wave length corresponding to the radio frequency that the radio unit operates at wherein the vertical distance is measured perpendicular to the second plane.

9. The wearable device of claim 1, wherein the loop antenna is coupled to the radio unit via a balancing means at two separate points located substantially 90° apart from each other on the conductor loop of the loop antenna with respect to the center of the conductor loop in order to enable the use of circular polarization.

10. The wearable device of claim 9, wherein the balancing means comprises a balancing transformer.

11. The wearable device of claim 9, wherein the balancing means comprises a balanced transmission line.

12. The wearable device of claim 1, wherein the length of the conductor of the loop antenna is substantially equal to a wavelength corresponding to the radio frequency at which the radio unit operates.

13. The wearable device of claim 1, wherein said at least one circuit substrate is a printed circuit board.

14. The wearable device of claim 1, wherein the radio unit comprises a radio receiver and/or a radio transmitter.

15. The wearable device of claim 14, wherein the radio unit comprises a GPS receiver.

16. The wearable device of claim 1, wherein the wearable device comprises a display unit.

17. The wearable device of claim 1, wherein the wearable device comprises a watch circuit.

18. The wearable device of claim 1, wherein the wearable device comprises a computer.

19. The wearable device of claim 1, wherein the wearable device comprises a wrist watch type housing of electrically non-conducting material.

IX. EVIDENCE APPENDIX (37 C.F.R. §41.37(c)(1)(ix))

There is no evidence to be included.

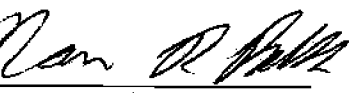
X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. §41.37(c)(1)(x))

There are no related proceedings.

XI. SIGNATURE PAGE

This Brief is being filed with a petition for a two-month extension of time and the required fee. In the event that any other extensions and/or fees are required for the entry of this Appeal Brief, the Patent and Trademark Office is specifically authorized to charge such fee to Deposit Account No. 23-2820 in the name of Wolf, Block, Schorr & Solis-Cohen LLP.

Respectfully submitted,
WOLF, BLOCK, SCHORR & SOLIS-COHEN LLP.

By: 
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